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SUBSURFACE STRATIGRAPHY OF PENNSYLVANIAN FORMATIONS ASSOCIATED WITH COAL NO. 6 IN THE REGION OF CENTRALIA, ILLINOIS

BY

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Subsurface Stratigraphy of Pennsylvanian Formations Associated with Coal No. 6 in the Region of Centralia, Illinois*

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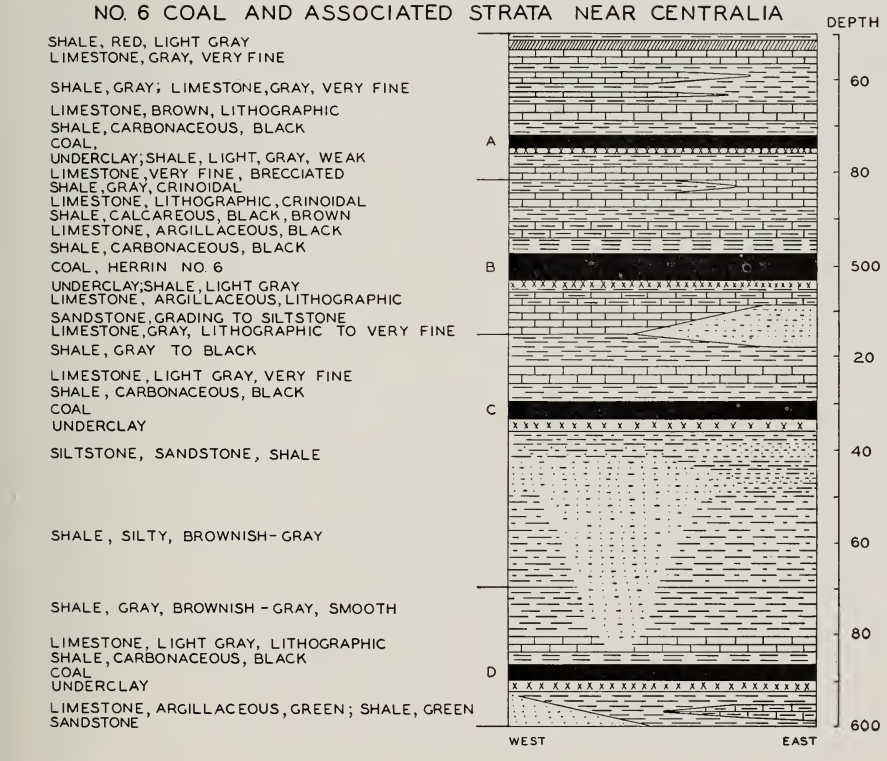
Studies of cuttings from oil wells show a certain succession of strata associated with Coal No. 6 occurring over wide areas in Clinton and western Marion counties and adjacent regions. Because Coal No. 6 is frequently used for structure maps, it may be useful to describe the various elements in this group. The strata comprising a thickness of 150 feet includes four coal seams of which the second from the top is Coal No. 6, well known from mining operations and commonly used for Pennsylvanian structure maps. There are at least four groups of beds, each group containing a coal. The coals are designated as Coal A, Coal B or No. 6, Coal C, and Coal D, respectively, from top to bottom. In making this study data were used from the study of sample cuttings from fifteen wells in the Centralia region, three in the Bartelso field, two in western Clinton County, and four others at intervening locations.



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The upper group contain Coal A and extends from a red rock at the top to a brecciated limestone at the bottom. The red rock is a red shale grading to light greenish-gray. Directly below the red rock is a very fine gray limestone, which in some places is cherty, the chert appearing to be a siliceous replacement of the limestone. Under the limestone is a medium gray, slightly calcareous shale which reaches a thickness of about 15 feet in the Centralia region but thins toward the west with an accompanying addition of limestone lenses. The limestone is usually very fine and light gray but is occasionally medium grained with fossil fragments. In the extreme western part of Clinton County it is somewhat dolomitic and the color grades from gray to light brown. Between this limestone and the black shale associated with Coal A is a light to dark brown limestone which is, in most places, lithographic, but is slightly dolomitic in western Clinton County. Overlying Coal A is a highly carbonaceous, very firm black shale which, however, does not have a slaty appearance. The coal is usually only about 2 feet thick. Coal A is followed below by a light gray, weak underclay grading to shale, and a very fine, brownish-gray, partly brecciated limestone.

The beds in the group associated with Coal B or No. 6 may be divided into three parts: 1) The upper shale and limestone, 2) the middle shale, limestone, slate, coal, and underclay, and 3) the limestone and sandstone below the coal. Both the shale and limestone in the upper portion of this group are crinoidal. The shale is calcareous, gray, smooth, and is prominent in all of Clinton County, except the extreme eastern part where it becomes only a thin parting between the limestones. The limestone is light brownish-gray in color with a lithographic to very fine texture. The middle shale is calcareous and gray. It becomes brownish in the western portion and dark gray in the eastern portion of Clinton County. The underlying limestone is a very persistent horizon and is constant as to lithology over a wide area. It is argillaceous, dark brown to black, very fine grained, and contains numerous foraminifera which are white or have a white outline giving the limestone a speckled appearance. Below the limestone is a very carbonaceous, black slaty shale. Coal No. 6 has an average thickness of about 6 feet. It commonly has a blue shale band noted in diamond drill records and outcrop descriptions, but not evident in the sample cuttings. Below the underclay in the lower part of this group is a layer of limestone about 2 to 5 feet thick which is argillaceous, nodular, gray, very fine to lithographic; it is pyritic and sideritic in some places and often brecciated. In the west it thickens and becomes a pure lithograph limestone in the lower part. Below the limestone in western Marion and eastern Clinton counties is a sandstone which grades to siltstone. It is about 10 feet thick in the east but lenses out to the west in western Clinton County. The sandstone is very silty, light gray to gray, very fine, and usually rather compact although it is friable in some localities. The siltstone is either interbedded with the sandstone or completely takes the place of it.

In the group which includes Coal C is a shale and limestone section above the coal with underclay and silty shale to sandstone below. The shale at the top of the group is dark gray to black in eastern Clinton County but grades to a gray shale in the west. Under the shale is a light gray, very fine limestone. In some places these beds have been cut out and are replaced by the sandstone occurring below Coal No. 6. Above Coal C is a carbonaceous black shale similar to the one above Coal A, although in some places it is brownish-gray instead of black. Coal C is commonly two or three feet thick and has an associated underclay. Below the underclay is a gray to brownish-gray, silty. firm shale interbedded with gray, argillaceous siltstone. In central Clinton County this shale and siltstone are represented by a sandstone that occupies the interval to the black shale above Coal D. In the eastern and western parts of the county the imbedded siltstone and sandstone grade downward into a brownish-gray, silty shale.

The last group has at the top a shale, limestone, and sandstone. The upper shale of this group is gray to brownish-gray, smooth and firm, and is not silty as is the overlying shale. Below this shale is a light to medium gray, lithographic to very fine limestone, which is underlain by a carbon-

aceous black shale similar in appearance to that above Coal B or No. 6. Coal D is generally about 3 feet thick; below the coal is an underclay about 2 to 3 feet thick. The underclay grades downward into a weak to firm green shale containing lenses of greenish, argillaceous, lithographic to very fine limestone, which is occasionally quite pyritic. These beds thin and disappear to the west so that the sandstone which is below the limestone and shale is in contact with the underclay. The lower sandstone is silty, light gray, very fine, and compact.